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PREVALENCE OF OVERWEIGHT AND OBESITY IN ADOLESCENT SCHOOL CHILDREN WITH REFERENCE TO BODY MASS INDEX AND LIPID PROFILE

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ABSTRACT: BACKGROUND: According to World Health Organization estimates, by the year 2020, non-communicable diseases accounts for three quarters of all deaths in the developing world. India is in the midst of rapidly escalating epidemic of Type 2 Diabetes Mellitus, Coronary Heart Disease. Obesity seems to have a central role in this cluster. The key to Obesity prevention is to screen, intervene early, and incorporate physical activity and dietary modifications. **OBJECTIVES**: To study the prevalence of Metabolic Syndrome in obese & adolescent school children with reference to BMI and lipid profile, and to compare the Children belonging to High and Low Socioeconomic status. **METHODS:** An Institution based cross-sectional study conducted in Niloufer Hospital, Hyderabad a tertiary care teaching Hospital for a period of nine months. Affluent and poor socioeconomic status segments of age group of 11-17 years of both genders are taken for the study. 800 children were studied, Inclusion and Exclusion criteria were fallowed, a structured proforma was designed for the study and analysis was done using SPSS windows version 15.0. Mean Values and Standard deviations of the clinical and laboratory data of the children and frequency of cardiovascular risk factors were calculated. **RESULTS**: out of 800 adolescent School Children studying VI to X Standards of age groups of 11-17 years of both genders, 390 children from HSES were surveyed and 59.74% were males (n=233) and 40.25% were females (n=157) and the prevalence of obesity, Diabetes mellitus, and coronary Heart disease in parents of children of HSES is more in comparison with LSES. Out 65 overweight/obese children evaluated for metabolic Syndrome and presence of cardiovascular risk factors, 25% of them are obese (n=16). 75% of them are overweight (n=49). **CONCLUSION:** this study showed that clustering of cardiovascular risk factors and metabolic Syndrome has its origin in childhood and they are strongly associated with obesity. The prevention and treatment of obesity in childhood could go a long way in preventing the development of Type 2 DM and CHD in early adulthood.
KEYWORDS: PIH Mothers, Neonatal Mortality and Morbidity, Prospective Study.

INTRODUCTION: The prevalence of chronic or non-communicable disease is escalating much more rapidly in developing countries than in industrialized countries.[1] Obesity seems to have a central role in the development of this cluster. [2] Indians as an ethnic group is particularly at high risk for the metabolic Syndrome or insulin resistance syndrome which is the harbinger of T2 DM and CHD.[3, 4]

It is now emerging convincingly that these disorders begin in childhood or even earlier, in fetal life (Barker hypothesis. Childhood obesity was considered a problem of affluent countries. Today the problem has started appearing even in developing countries. Globally the prevalence of childhood obesity varies from over 30%. Available studies of Chennai and Delhi has shown the prevalence of 6.2% and 7.4% respectively.[5,6] 50 - 80% of obese children will continue as obese adults and falls into risk group of Diabetes, Hypertension, CHD and other obesity related diseases.[7, 8, 9]

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The American obesity Association uses the 85th percentile for age and sex as a reference point for overweight and the 95th percentile for age and sex as obesity in children.

MATERIAL AND METHODS: The study was conducted over a period of nine months from July 2011to March 2012 amongst adolescent school children between ages of 11-17 years of both genders. Three Schools of Hyderabad were selected, one catering to the affluent segment children and the other two schools catering to segment of low socioeconomic status. This is an Institution based cross-sectional study.

Prior permission from the Head of the institutions for conducting the Study in Schools, written informed consent/Ascent forms were taken from the parents/ children who were offered the study and Permission was taken from Institutional Ethics committee. Chromosomal disorders, Handicapped children, Endocrinal obesity were excluded from study. Out of total 800 children, 390 are From High Socio economic status(HSES) and 410 are from Low Socio economic status (LSES).

A Pre-tested Questionnaire to collect personal particulars, Family History of obesity, DM & CHD, dietary habits, Physical activity, TV viewing and socioeconomic particulars is used. Electronic weighing Scale to measure weight in kg, Stadiometer to measure Height in cm is used. Body Mass index was calculated as weight in kg divided by height square (m2). The degree of obesity was quantified using the NCHS/CDC charts. Waist circumference (WC) was measured and percentiles were calculated.

Blood pressure was measured and compared with reference values prepared according to age, sex and height. Blood samples were collected for blood glucose, serum lipid levels, Triglycerides and HDL cholesterol was measured using enzyme assays and categorized based on National Cholesterol education Programme, NCEP ATP-III Panel.[10] LDL-C was estimated by Friedewald formula (Friedewald Formula for LDL-C= Total cholesterol – HDL). WC & BP were compared with the percentiles for the respective age and sex, Blood glucose, Serum TG, HDL -Cholesterol and WC exceeding 75 percentile was considered as abdominal obesity.

Statistical Analysis was done by using SPSS windows version 15.0 and Mean Values and Standard deviations of the clinical and laboratory data of the children and frequency of cardiovascular risk factors were calculated. Chi-square test was used to measure the significance of risk factors in metabolic syndrome.

RESULTS: A total of 390 children from HSES were surveyed out of which 59.74% were males (n=233) and 40.25% were females (n=157). It is observed that prevalence of obesity, Diabetes mellitus, and coronary Heart disease in parents of children of HSES is slightly more when compared to parents of children of LSES.[11] similarly; the percentage of Children on mixed diet with increased fatty food consumption & TV viewing is more in HSES when compared to LSES children. Physical activity is more in LSES compared to HSES.

A total of 65 overweight/obese adolescent children were evaluated for the prevalence of metabolic Syndrome[12] and presence of Cardiovascular [13] risk factors and in them 25% are obese (n=16) and 75% of them are overweight (n=49). The mean values of fasting blood sugar and fasting triglycerides, VLDL, LDL, HDL and waist circumference are listed in the table below.

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SL. No.	Risk factor	Mean ± S.D.
1.	Waist circumference	84.08+ 10.15
2.	Fasting Blood Sugar	79.2 ± 11.66
3.	Fasting Triglycerides	128.03 ±32.76
4.	Very low density lipoproteins	25.23 ±6.56
5.	Low density lipoproteins	78. 6 ±25. 2
6.	High density lipoproteins	48. 4 ±6. 53

It is observed that prevalence of metabolic Syndrome in obese adolescents is 15.38% and over wt. adolescents is 23.07%.[14, 15] Regarding prevalence of Cardiovascular risk factors, Clustering of one or two risk factors is seen in 57% overweight/ obese children.[16] It is observed in the study that 77% (n=50) of over wt./obese children have visceral obesity (WC >75 centile for age and sex), 11% (n=7) have elevated systolic BP for age, height and sex, 1.5% (n=l) have elevated Fasting Blood sugar, 80% (n=52) have high fasting triglyceride levels and 48% (n = 31) have low fasting HDL-C levels.[17] 13% of children with history of obesity in parents developed metabolic syndrome and 14% had one or more risk factors. 28% of obese/over wt. children without any physical activity had metabolic Syndrome.[18, 19] 36% who consume energy rich foods(fatty foods) had metabolic Syndrome. 18% of TV viewers had Metabolic Syndrome.[20]

DISCUSSION: Present study shows 4.10% obesity and13.84% over weight in affluent children. Studies of Chennai and Delhi have shown the prevalence of obesity as 6.2% and 7.4% respectively which is higher compared to the present study.[5, 6] In Brazilian study, prevalence was 7.7%. Mean BMI is more in HSES children compared to LSES children.[21] This could be due to obesogenic lifestyle observed in affluent people. Unhealthy eating patterns, sedentary life, inadequate physical activity, wrong choices of food like processed foods and junk food contribute to the rise in prevalence of obesity. Regarding prevalence of metabolic syndrome, obesity is a key factor in the development of insulin resistant metabolic syndrome. Based on Ferrannini et al, prevalence is 23% in Obese and 15.38% in overweight children.[22]

In a study by Cook et al prevalence was 28.7%. In Hungarian study by Romics.L.et al, prevalence was 8.9% in obese children.[23] It is observed in the present study that 13.84% of children had one risk factor, 93.07% had two risk factors and 38.46% (Over weight and obese) have metabolic Syndrome. These findings are consistent with those reported by Csabi et al.[20] In a study from Mexico & Egypt by Salazar- Martiner Fernandez prevalence of metabolic Syndrome was 2.1% in obese children clustering of one and two risk factors was 44% and 32.80% respectively.[24]

In the present study clustering of one risk factor is less and two risk factors are more compared to Turkey study. Body composition and metabolism of Asian Indians makes them more susceptible to obesity and metabolic Syndrome compared to Caucasians. Hence because of ethnic predisposition of Asian Indian Children and adults to metabolic syndrome there is a need to screen the children, identity those with risk factors and intervene early to reduce the morbidity and mortality associated with Type 2 DM and premature Atherosclerosis.

CONCLUSION: The key to obesity prevention rests with identification of subjects with modifiable risk factors, screen them, diagnose and intervene early. The main emphasis should be on life style

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changes, moderate physical activity and dietary modifications. Community intervention programmes have to be initiated.

The prevention and management of the metabolic syndrome should be instituted early in childhood to prevent early onset Type 2 Diabetes mellitus and Coronary heart disease.

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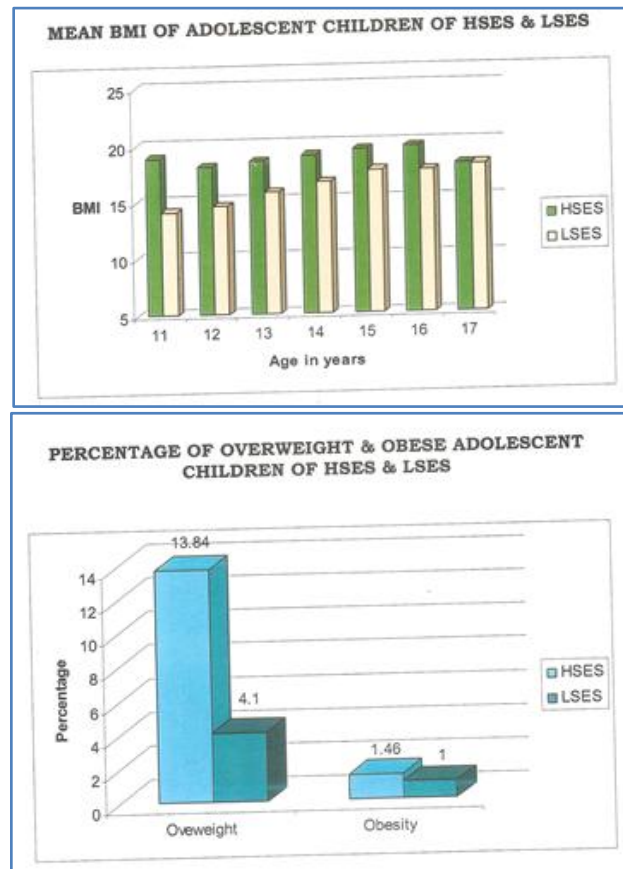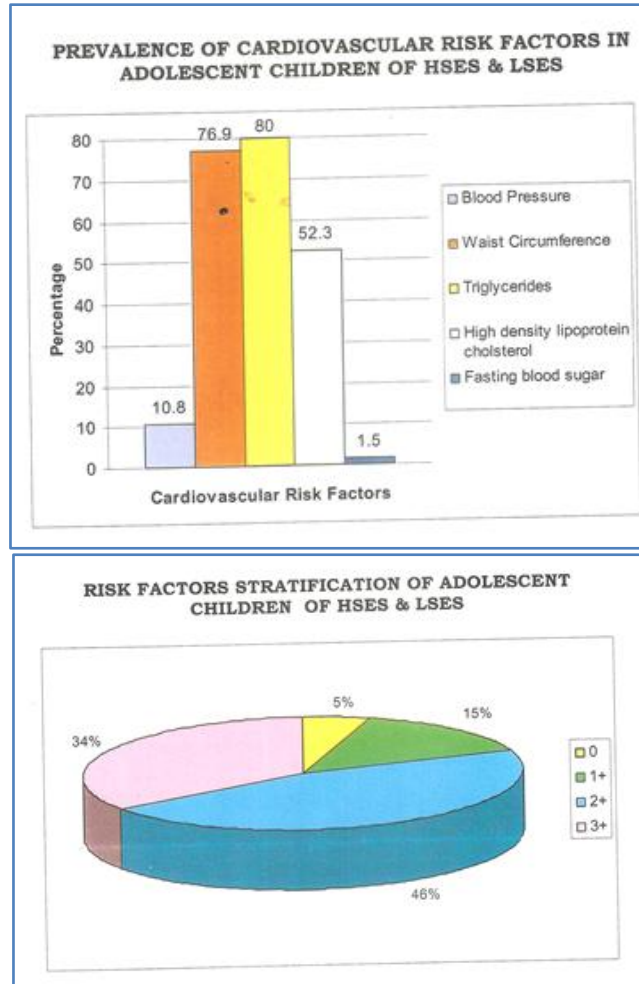
Figure 1

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Figure 2

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